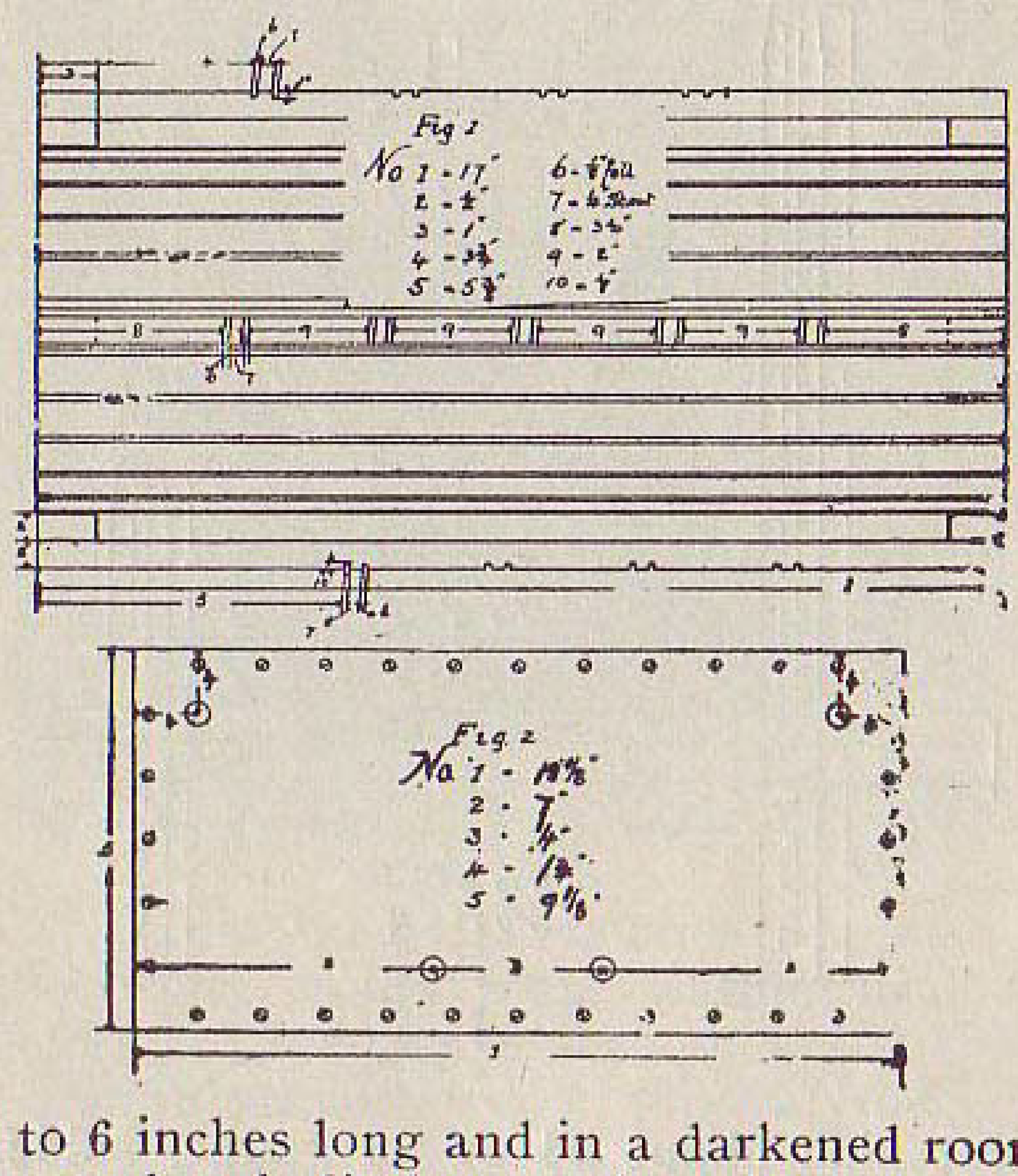
A TESLA COIL.

By A. C. Austin, Jr.

The Tesla coil, shown in the illustrations was recently built for the purpose of experiment, and as many strange and beautiful effects may be obtained with it, the author will describe in detail the construction of the apparatus.

This particular coil, when used with a two-inch induction coil, and a condenser of four sheets of tinfoil 10x12 inches mounted on glass plates, gave a

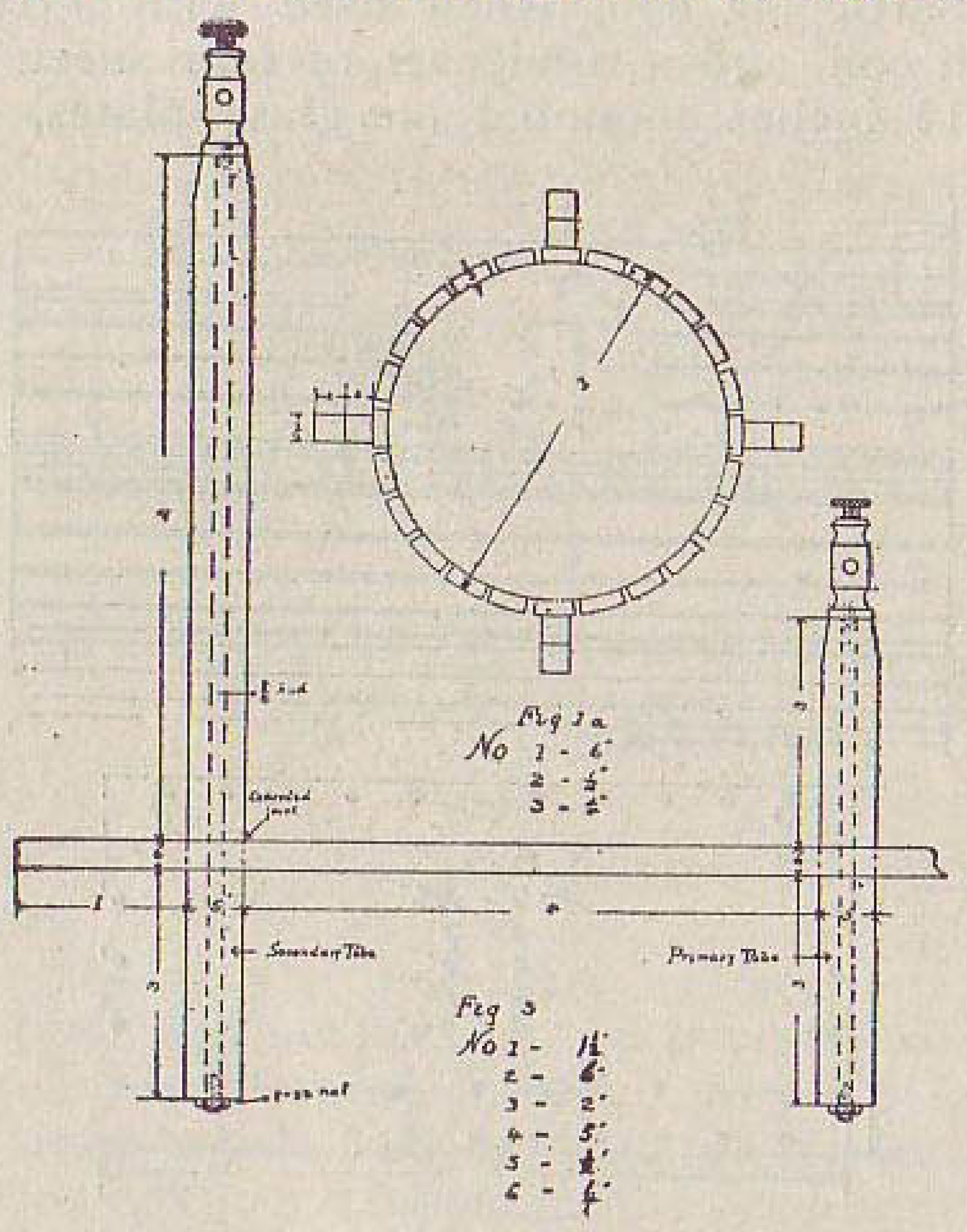


spark 4 to 6 inches long and in a darkened room there was a heavy brush discharge when the terminals were separated about eight or ten inches, and occasionally a single spark would pass even at this distance. At all times the secondary terminals, when the light in the room is turned down will have a luminous glow, and streams of light will be seen emanating from them in all directions, at times more intense than

usual, and particularly so when one of the secondary terminals is grounded. When the terminals are placed just beyond the distance at which sparks will pass, a great amount of ozone will be liberated.

The construction details of the coil in question are as follows:

Obtain, or make a case 18x9x9 inches, inside measurement, made of ¼-inch hard wood, and line same



with sheet zinc about 24 or 26 gauge, soldering at the joints, and being sure that they are liquid tight. One-quarter of an inch from the top of the case, place a strip ½ inch square all the way around the inside this forming a base to set the cover on and to screw same to, leaving a space about two inches long in the middle of each end for the supports of the coil to fit through.

Make a cylinder of wood 6 inches in diameter and 17 inches long. This cylinder may be built by nailing slats around several wood discs. On this cylinder after rounding the edges of the slats with a rasp, wind four hundred turns of No. 30 B. & S. gauge single cotton covered wire, beginning a little more than an inch from the end of the cylinder and winding the turns as accurately as possible 1/27 of an

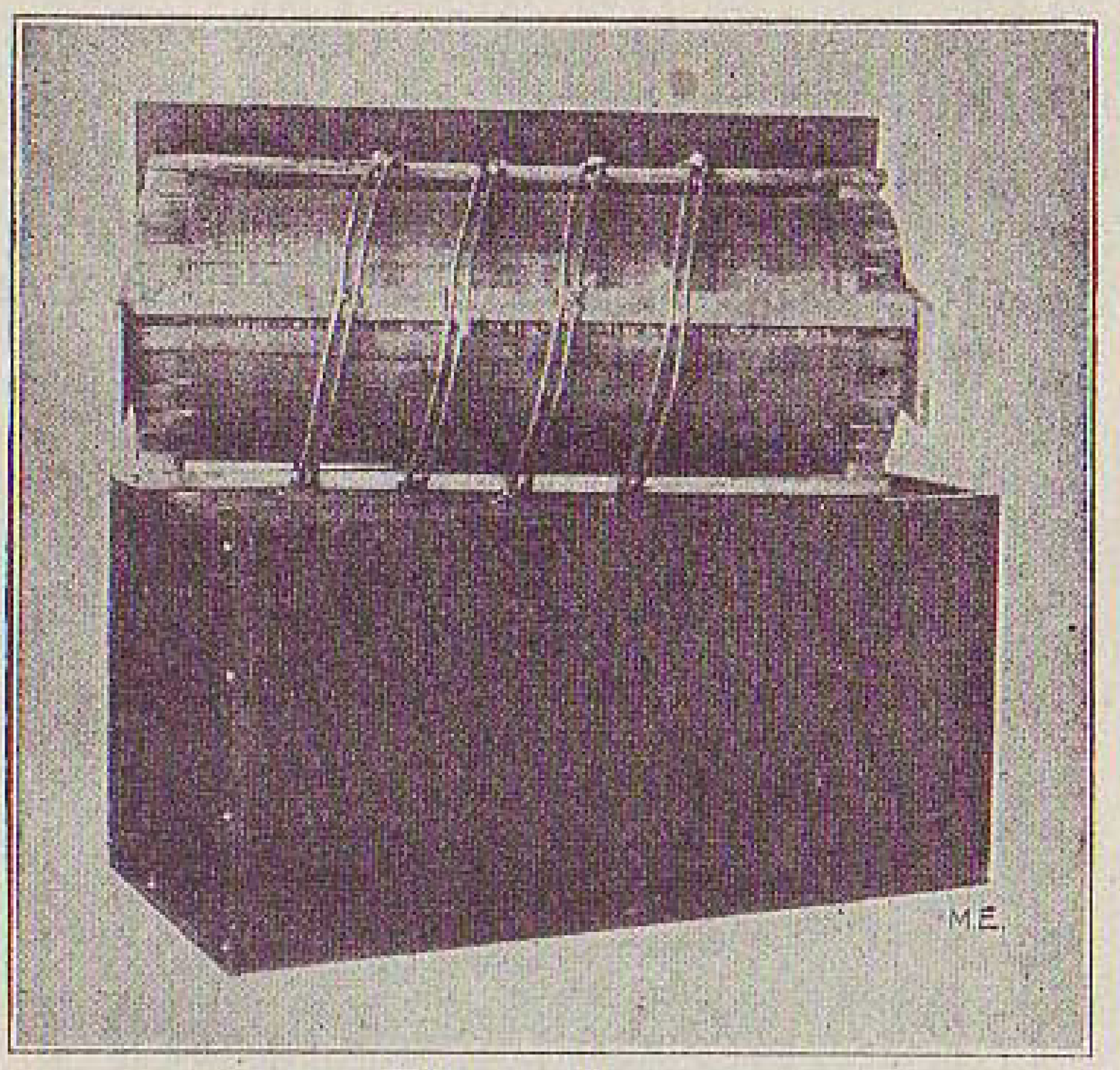


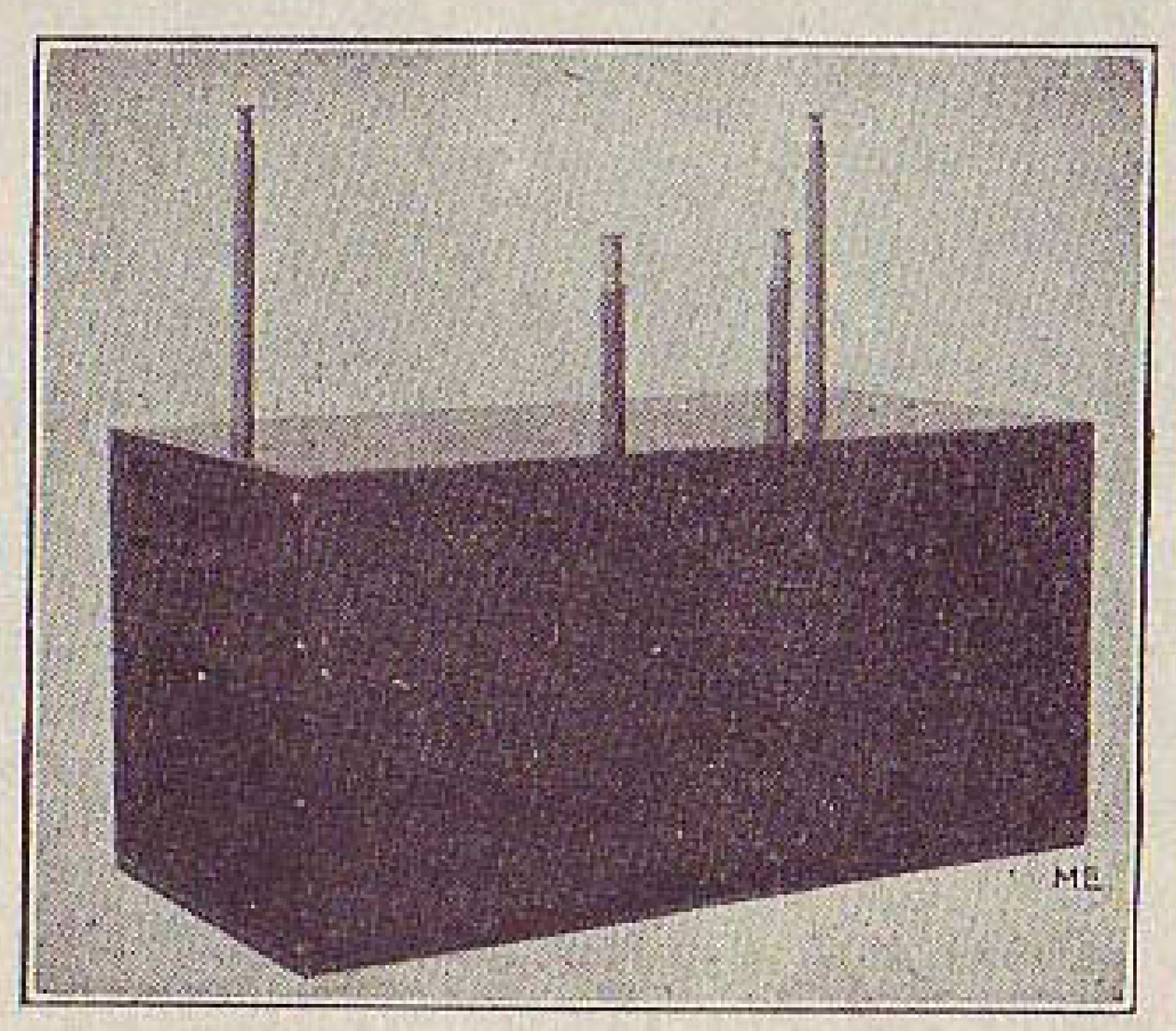
Figure 4

inch apart. Coat the cylinder and wire with shellac, giving some four or five coats, waiting until the first is dry before putting on the second, and so on.

Place four blocks of wood, ½x½x1 inch at equal distances from each other, on each end of the coil, so as to form supports for four sticks, ½x½x17 inches, running lengthwise on the coil and separated from the secondary wire, on which to wind the primary coil.

Now make two grooves ⅛ inch deep and ⅛ inch wide, making this measurement a trifle full and cut same a scant ¼ inch apart, the edge of the first groove

to be 3¼ inches from the end of the coil on the strip which is to be at the top of the coil when finished, and, turning the coil in the same direction as when winding the secondary, cut two grooves 3¾ inches from the end on the next stick, 4¼ inches on the next strip and coming back to the strip from which the start was made 5¼ inches from the end, making the last grooves just 2 inches away from the first ones cut, continuing on until enough grooves have been cut to wind four complete double turns of wire in. Procure about 30 feet of No. 6 B. & S. gauge soft drawn bare copper wire, and wind four double complete turns in the grooves, fastening same into the grooves by tieing with stout cord or twine. All of the preceding



Finished Coil

operations are clearly explained in Fig. 1, and also by the photographs, Figs. 4 and 5.

Obtain a sheet of hard rubber 18⅛x9⅛x¼ inches and trim to fit perfectly tight in the top of the transformer case. Drill the holes for screws around the edges and then drill a hole at each end ½ inch in diameter, the center of the hole to be 1¾ inches from the side and 1¾ inches from the end of the rubber

sheet as shown in Fig. 2. Also on the opposite edge of the rubber sheet drill two holes ½ inch in diameter 4 inches apart and each one 7 inches to center, from the end, as also shown in Fig. 2.

Insert in the first mentioned holes hard rubber tubes ½ inch in diameter, projecting 2 inches below the cover, and 6 inches above, fastening same tightly

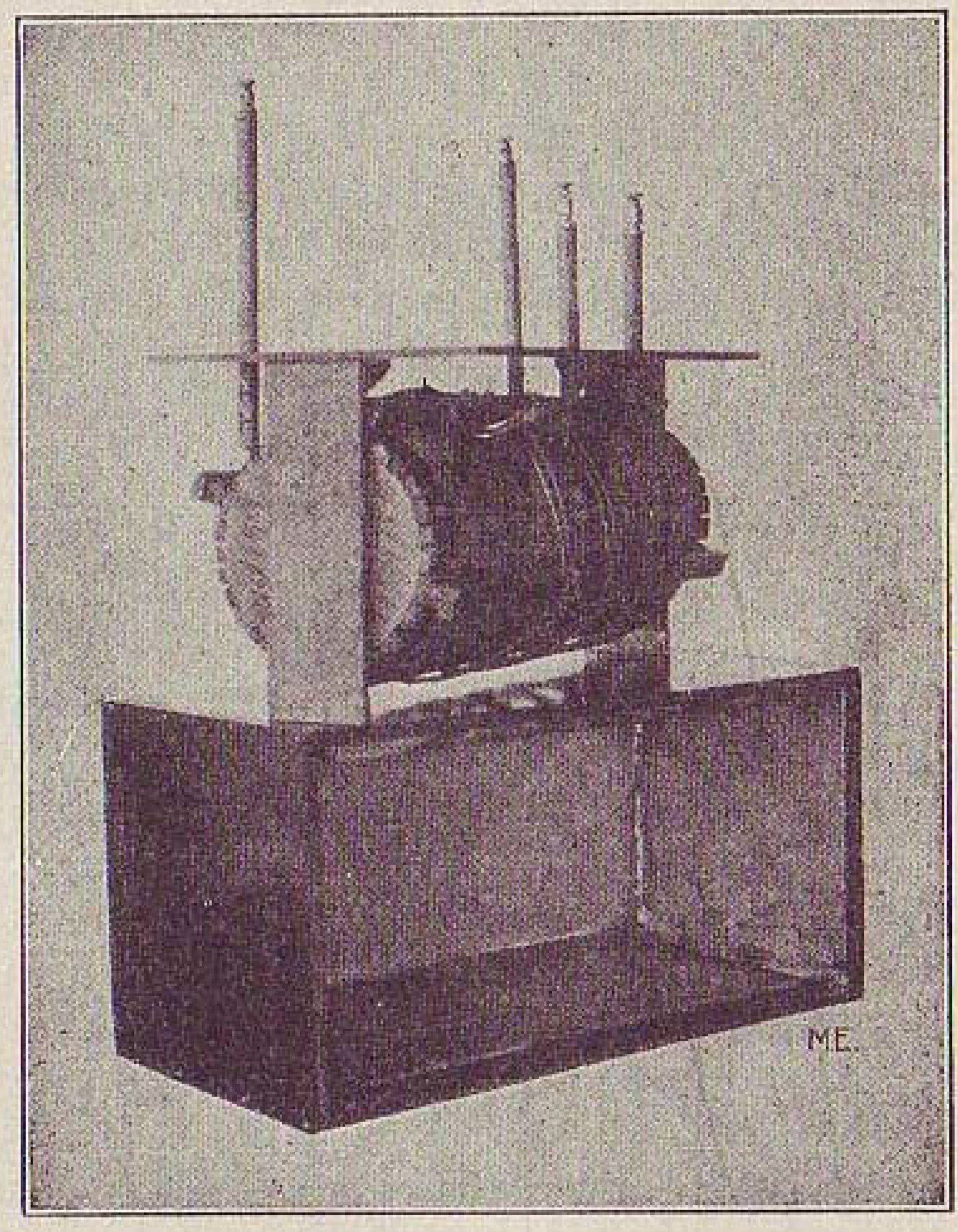


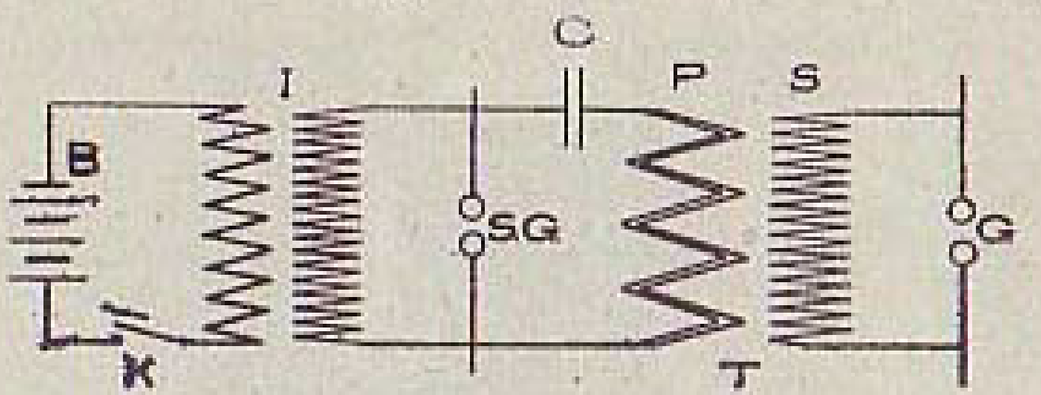
Figure 5

by cement (Fig. 3). The two other holes should be fitted with tubes of the same kind, projecting 2 inches both above and below. Now make four pieces of brass rod ¾ inch longer than the tubes, and put ½ inch of 8/32 thread on each end, and putting these rods through the tubes screw a binding post on the

top and a nut and washer on the bottom to clamp same into the tubes. The last operation is clearly shown by Fig. 3.

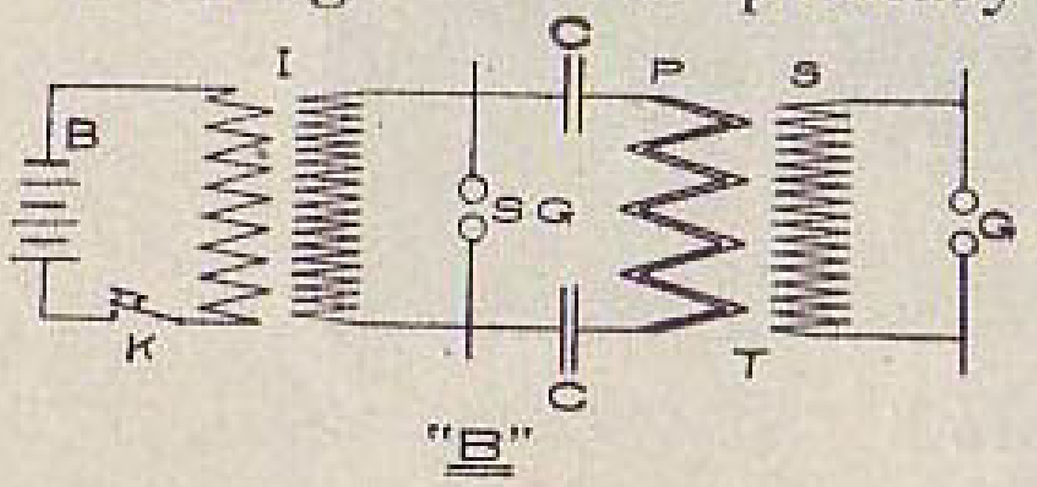
Now take the coil, and on each end place a standard of wood ½ inch thick, making a bracket shaped piece to fit the top of the standard, and projecting inwards, so that the rubber top may be screwed to these standards, and hold the coil suspended in the oil. The exact measurements and details of this operation cannot be given, and it will be necessary for the person building this coil to use the head a little bit, and simply make it fit. Photograph 5 will give a fairly clear idea of the method used by the author.

Connect the secondary terminals to the brass rods

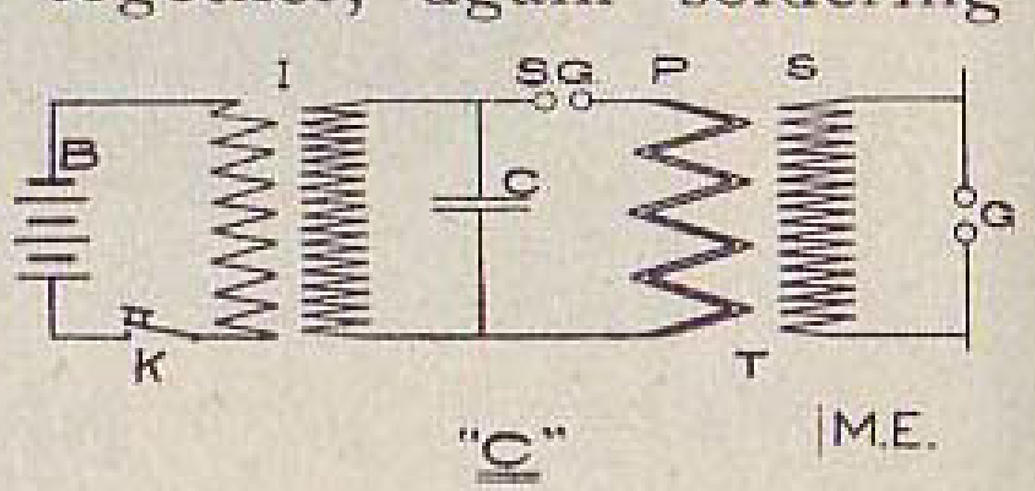


"A"

running through the secondary tubes, soldering same tightly, being careful not to leave any slack wire, and running straight from the end of the winding to the rod, and not too close to either the primary winding or the zinc lining of the case. Now connect the two windings of the primary together, again soldering



"B"



"C"

M.E.

well, and making the windings in parallel, and then connect to the brass rods running through the primary tubes. This last operation is somewhat difficult and care must be taken not to make the single wire cross over too close, as one of the turns might short circuit.

Procure about five gallons of linseed or paraffine oil, and after boiling pour into the case while still warm, putting in enough to fill the case about ¾ full. Now lower the coil slowly and carefully into place, and just before screwing down the cover see that the oil comes up to about ½ inch from the cover. The placing of the coil into the oil while still warm drives all the air bubbles out, and diminishes the danger of the insulation breaking down. However, the oil must not be too warm when the coil is immersed, as the heat might melt the rubber tubes and cause the rubber top to warp.

A number of different methods of connection are shown by the diagrams "A," "B" and "C," and these may all be tried. The amateur using this coil will experience some difficulty in obtaining the right length of spark and the right capacity of the condenser, but when the right adjustment is found the coil will be found to work very satisfactorily. Of course with a larger induction coil, for instance a 3 or 4-inch coil the transformer will do a greater amount of work, but as before stated, a two-inch coil is used by the author. A smaller coil was tried but the result was very unsatisfactory.

This Tesla coil has been used both for experimental and for wireless work, and has given very satisfactory service.